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# MADROÑO

## A WEST AMERICAN JOURNAL OF BOTANY

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## MALACOMELES, A GENUS OF MEXICAN AND GUATEMALAN SHRUBS

GEORGE NEVILLE JONES

During a study of the American species of the rosaceous genus *Amelanchier* it has become apparent that the shrubs of Guatemala, Mexico, southern Texas, that have been variously treated as a section of *Amelanchier*, or of the gerontogean genus *Cotoneaster*, or as a group separate from both, have certain claims to recognition as a distinct genus. This genus, whose legitimate name for reasons set forth below, is *Malacomeles* Decaisne, is probably most closely related to *Amelanchier* Medic., and to the monotypic *Peraphyllum* Nutt., of the western part of the United States.

I am indebted to Dr. M. L. Fernald, Director of the Gray Herbarium (GH), to Dr. A. C. Smith, Curator of the Herbarium of the Arnold Arboretum (AA), and to Mr. P. C. Standley, Curator of the Herbarium of the Field Museum of Natural History (FM), for the loan of herbarium specimens.

## NOMENCLATURAL HISTORY

The group of plants under consideration was first recognized as a distinct genus by J. Lindley in 1845. He described it as follows:

"This plant, the *Cotoneaster denticulata* of Mr. Bentham, has all the structure of that genus in its flowers, and much of its habit; but its fruit proves it to be a new genus, which I trust may bear the name of the ingenious Mr. Nägeli, the fellow-worker of Schleiden in botanical investigation. The fruit is a very pale pink colour, about as large as a pistol ball, with a brittle semi-transparent flesh, and the thin putamen of a *Pyrus* instead of the hard bony stone of a *Cotoneaster*. It may be defined as follows—*Nagelia*. Petala parva, patula. Stamina 10–15. Carpella 2, dorso calyci adnata, ventre libera, ovulis 2 collateralibus ascendentibus. Pomum sphaeroideum, calyce coronatum, carnosum, fragile, endocarpio membranaceo. Semina cuique loculo 2, compressa, castanea, ascendentia. Cotyledones tenues plano-convexae.—Frutex *Cotoneasteris* vultu, canescens; sepalis semimembranaceis; petalis calyce longioribus patentibus."

In 1847, M. J. Roemer had also been in doubt as to the propriety of including the only known New World species, *C. denticulata* Kunth, in the otherwise wholly gerontogean genus *Cotoneaster*. Roemer, however, proposed no taxonomic changes, but merely commented as follows: "Sola species americana hucusque nota; an congener?" It was not until 1874 that the theory of the taxonomic distinctness of this group was again advanced, this time by the French botanist Decaisne, who placed *C. denticulata* "H.B.K.,"

and a newly described species, *C. nervosa* Dene., in his proposed section *Malacomeles* of *Cotoneaster*. This section included Mexican shrubs with denticulate leaves and small white flowers. The brief description is as follows: "Frutices mexicani, foliis insigniter pennatinerviis denticulatis; floribus albis, parvis, axillaribus racemosis v. corymbosis terminalibus; fructibus omnino baccatis." The statement concerning the fruit is evidently an error, because none of the Pomoideae has baccate fruits. Fruits of *Malacomeles* that I have dissected are structurally very similar to those of *Amelanchier*. It should be noted that Decaisne in 1874 actually treated *Malacomeles* as a section of *Cotoneaster*, but in 1881, in reply to criticism by Wenzig of his memoir, he refers to *Malacomeles* as if he had published it as a genus.

The next nomenclatural contribution was made in 1890 by E. Koehne, who described two new species under *Amelanchier*. The first was *A. utahensis*, a true *Amelanchier*, the common and variable xerophytic species of desert and mountainous areas of western United States. The second was described as *A. Pringlei*, and was based upon one of Pringle's collections from Chihuahua, Mexico, (*Pringle 259*) that had been distributed as *Cotoneaster denticulata*. Koehne thus grouped his supposed new species, *A. Pringlei*, which belongs with Decaisne's *Malacomeles* (and is a synonym of *M. denticulata*), with a true *Amelanchier*, *A. utahensis*. In 1906, Schneider protested against this unnatural arrangement and reinstated *Nagelia* as a genus, citing *N. denticulata*, with two varieties, and *N. Pringlei*, as the component species. Rehder, in 1935, transferred Decaisne's section *Malacomeles* from *Cotoneaster* to *Amelanchier*, and described *A. paniculata*, which he supposed to be different from *A. nervosa* (Dene.) Standl.

Whether it be maintained as a genus, subgenus, or section, *Malacomeles* Dene. is the earliest available name for this group, since Lindley's name, *Nagelia* (1845) being a later homonym, is illegitimate. *Nagelia* Lindl. is invalidated by the *Nagelia* of Rabenhorst, described one year earlier. In 1846, Lindley spelled the name *Nägelia*, but this is merely an orthographical variant. Decaisne's name is composed of the Greek *malakos*, "soft," and *meles*, "apple," presumably on account of the soft carpels, as contrasted with the bony carpels of *Cotoneaster*.

#### RELATIONSHIPS WITHIN THE POMOIDEAE

It is at once evident that *Malacomeles* is a bona fide member of the subfamily Pomoideae Focke of the Rosaceae. The cartilaginous or membranous texture of the carpels is a character that at once separates it from *Crataegus*, *Cotoneaster*, *Mespilus*, *Pyracantha*, *Hesperomeles*, and *Osteomeles*, the latter having pinnate leaves. By the character of the inflorescence, *Malacomeles* is distinguished from *Sorbus*, *Aronia*, *Photinia*, *Stranvaesia*, and *Eriobotrya*, which have the flowers in compound corymbs or panicles. That *Mala-*



*comeles* does not belong with *Docynia*, *Chaenomeles*, and *Cydonia* is attested by the fact that those genera have the carpels four- to many-seeded. Evidently the true affinities of *Malacomeles* lie with the genera *Malus*, *Pyrus*, *Amelanchier*, and *Peraphyllum*. *Malus* and *Pyrus* have the ovary and fruit two- to five-loculed, each locule being two-ovuled; but in *Amelanchier*, *Peraphyllum*, and *Malacomeles* each locule in the fruit is nearly divided by a false partition growing from the back of each carpel, thus forming an incompletely four- to ten-loculed pome containing, if all mature, only one seed in each locule.

Although supposed originally by Lindley, and later by Decaisne to be closely related to *Cotoneaster*, or even to comprise a section of that genus, *Malacomeles* is rather far removed, phylogenetically, in spite of the fact that the habit and appearance of some of the species of *Cotoneaster* suggested a close relationship. The fact that *Malacomeles* is not closely related to *Cotoneaster*, much less is a section of that genus, is clearly shown by the fact that the latter has the carpels bony at maturity, and the fruit has one to five nutlets. *Cotoneaster* is thus more closely related to *Crataegus* than to the *Amelanchier* group. The leaves of *Cotoneaster* are mostly entire, and the species are confined to the Old World, in Europe, Asia, and Northern Africa.

These three genera may be distinguished by the following key:

- Mature fruits yellowish, bitter, astringent, inedible; flowers solitary or in umbel-like corymbs; the bracts promptly deciduous; petals pink or rose, obovate; calyx-lobes lanceolate, obscurely glandular-margined; leaves narrow, three to five times as long as wide, entire or nearly so, almost sessile, mostly fascicled at the ends of the branchlets; monotypic genus of western United States ..... *Peraphyllum*
- Mature fruits purplish black (sometimes drying brownish), or pink at first, sweet or insipid, normally juicy and edible; petals white; leaves distinctly petioled, not fascicled.
  - Petals suborbicular or reniform, the width not exceeding the length; calyx-lobes scarcely longer than wide, obtuse or acute, obscurely glandular-margined or entire; carpels free; bracts of the inflorescence more or less persistent; leaves coriaceous, denticulate to entire; shrubs of Guatemala, Mexico, and southern Texas (Brewster County) .... *Malacomeles*
  - Petals oblanceolate to oval, three to eight times as long as wide; calyx-lobes entire, linear-lanceolate to deltoid, acuminate or acute, mostly longer than wide; carpels connate below; bracts of the inflorescence promptly deciduous; leaves usually serrate or dentate; shrubs and trees of United States, Canada, Europe, and Eastern Asia ..... *Amelanchier*

*Malacomeles* (Dene.) stat. nov. *Nagelia* Lindley in Bot. Reg. 31 (Misc.): 40. 1845; Benthams and Hooker, Gen. Pl. 1: 1004. 1865; Schneider in Fedde, Rep. Sp. Nov. 3: 182. 1906. *Nagelia* Lindley, Veg. Kingdom 560. 1846; Wenzig, Linnaea 43: 80. 1880, not Rabenhorst, Kryptog. Fl. 1: 85. 1844, not Regel, Flora 31: 249. 1848. *Cotoneaster* sect. *Malacomeles* Decaisne, Nouv. Arch.

Mus. Hist. Nat. Paris 10: 177. 1874. *Cotoneaster* A. *Naegelia* Wenzig, Jahrb. Bot. Gart. Mus. Berlin 2: 304. 1883. *Amelanchier* sect. *Nagelia* Koehne, Gattung. Pomac. in Wiss. Beil. Progr. Falk-Realgymnas. Berlin 95: 25. 1890; Schneider, Illustr. Handb. Laubh. 1: 742. 1906. *Amelanchier* sect. *Malacomeles* Rehder, Jour. Arnold Arb. 16: 449. 1935. Type species. *Cotoneaster denticulata* Kunth = *Malacomeles denticulata* (Kunth) G. N. Jones.

Shrubs with unarmed branches and simple, coriaceous, alternate, petioled, pinnately veined, denticulate or entire leaves; stipules small, tardily deciduous or somewhat persistent; winter buds solitary, sessile, with several imbricate scales; flowers perfect, actinomorphic, entomophilous, corymbose or paniculate, terminating short leafy branches of the season, appearing after the leaves; pedicels with persistent linear or lanceolate green bracts; hypanthium campanulate or urceolate, more or less adnate to the carpels, becoming ellipsoid in fruit; disk nectariferous; calyx 5-lobed, the lobes broad, entire, imbricate in aestivation, persistent, becoming reflexed on the fruit; petals 5, white, suborbicular, the width equalling or exceeding the length; stamens 20, inserted on the rim of the calyx; styles 3 to 5, free to the base; carpels 3 to 5, cartilaginous or membranous, not bony; ovary inferior, 3- to 5-loculed, each locule 2-ovuled, but in fruit nearly divided by a false partition growing from the back of each carpel, thus forming an incompletely 6- to 10-loculed pome with one seed in each locule if all mature; pome small, berry-like, edible; seeds brown, flattened, smooth; endosperm none.

#### KEY TO THE SPECIES OF MALACOMELES

- Leaves of the flowering and fruiting branches small, the blades 0.5-1.5 cm. long; lateral veins 4 to 10 pairs, not very conspicuous beneath; sepals suborbicular, ciliate, 2 mm. long; petals 4 mm. long, glabrous; styles three, 2.5-3 mm. long; anthers 1-1.5 mm. long; mature fruits 6-8 mm. in diameter ..... 1. *M. denticulata*
- Leaves larger, usually 1.5-5 cm. long, the lateral veins 10 to 15 pairs, coarse and conspicuous on the lower surfaces; sepals triangular, 3 mm. long, microscopically glandular-denticulate; petals 5-6 mm. long, with a small tuft of hairs on the very short claw; styles five, 3-4 mm. long; anthers 2 mm. long; mature fruits 8-12 mm. in diameter .. 2. *M. nervosa*

1. *Malacomeles denticulata* (Kunth) comb. nov. *Cotoneaster denticulata* Kunth in H.B.K., Nov. Gen. 6: 169, pl. 556. 1823; M. Roem. Syn. Mon. 3: 222. 1847; Decaisne, Nouv. Arch. Mus. Hist. Nat. Paris 10: 177. 1874; Hemsley, Biol. Central Am. 1: 380. 1880; Wenzig, Jahrb. Bot. Gart. Mus. Berlin 2: 304. 1883. *Mespilus denticulata* Sprengel, Syst. Veg. 2: 505. 1825. *Nagelia denticulata* Lindley, Bot. Reg. 31 (Misc.): 40. 1845. *Amelanchier denticulata* (Kunth) K. Koch, Dendrol. 1: 183. 1869; Schneider, Illustr. Handb. Laubh. 1: 743, f. 416. 1906; Standley, Contr. U. S. Nat. Herb. 23: 337. 1922; Standley, Publ. Field Mus. Nat. Hist.



(bot. ser.) 8: 140. 1930. *Crataegus minor* Sessé and Moc., Pl. Nov. Hisp. 84. 1887; (ed. 2) 79. 1893. *Crataegus inermis* Sessé and Moc., loc. cit. *Amelanchier Pringlei* Koehne, Gattung. Pomac. in Wissen. Beil. Progr. Falk.-Real. Berlin 95: 25, pl. 2, f. 20. 1890; Schneider, Illustr. Handb. Laubh. 1: 742, f. 416, 417. 1906. *Nagelia Pringlei* Schneider in Fedde, Rep. Spec. Nov. 3: 183. 1907.

Shrubs 1-3 m. tall; twigs gray or brown when dry, grayish-tomentose when young, becoming glabrous; winter buds small, tomentose; leaves persistent, coriaceous, numerous, oval or elliptical to obovate or orbicular, conduplicate in the bud; upper surfaces of mature leaves glabrous, glossy, obscurely veined, the midvein impressed; lower surfaces closely grayish tomentose, the midvein prominent; mature blades 5-15 mm. long, 3-10 mm. wide, the apices mucronulate, varying from truncate to rounded or acute, the base shortly cuneate to rounded or truncate; lateral veins 4 to 10 pairs; margins denticulate to entire, the teeth when present 4 to 8 on each margin of average leaves of the flowering and fruiting branches; stipules small; petioles 2-4 mm. long, more or less tomentose; flowers about 1 cm. in diameter; inflorescence short, compact, few-flowered, somewhat corymbose; rachis and pedicels glabrous or pubescent, 3-6 mm. long; bracts persistent, carinate, lanceolate, green, ciliate, otherwise glabrous, about 2 mm. long; petals 5, white, suborbicular or reniform, veiny, 4 mm. long, 5 mm. wide, glabrous on both sides; stamens 20; filaments glabrous, minutely papillose; anthers 1-1.5 mm. long; hypanthium glabrous outside, campanulate, 3-4 mm. long, 3-4 mm. in diameter; sepals suborbicular, 2 mm. long, 2.5 mm. wide, rounded at the apex, ciliate, otherwise glabrous, green, soon reflexed; styles 3, glabrous, free to the base, 2.5-3 mm. long; carpels free; summit of the ovary densely white-tomentose; fruits in clusters of 1 to 4, ellipsoid to subglobose, glabrous, purplish black at maturity, 6-8 mm. in diameter; calyx-lobes on the fruit erect or ascending; seeds reddish-brown, smooth or nearly so, obliquely oval, somewhat compressed, 5-6 mm. long, about 3 mm. wide.

Type locality. Actopan, Hidalgo, Mexico.

Range. Brewster County, Texas, southward to Guatemala.

Specimens examined. UNITED STATES. TEXAS: El Solitario, *V. L. Cory* 1651, 1652 (GH); Glass Mountains, *O. E. Sperry* T673 (GH), *B. H. Warnach* 540 (GH). MEXICO. CHIHUAHUA: Santa Eulalia Mountains, *C. G. Pringle* 259 (AA, GH, FM, isotype of *Amelanchier Pringlei*); vicinity of Santa Eulalia, *Palmer* 136 (FM). COAHUILA: San Lorenzo Canyon, 6 miles southeast of Saltillo, *Palmer* 395 (FM). NUEVO LEON: San Francisco Canyon, about 15 miles southwest of Pueblo Galeana, *C. H. and M. T. Mueller* 289 (AA, FM); Hacienda Pablillo, Galeana, *Mary Taylor* 106 (FM). SAN LUIS POTOSI: Charcas, *C. L. Lundell* 5458 (FM); without definite locality, *C. C. Parry* and *Edw. Palmer* 230 (FM). HIDALGO: hills above El Salto station, *C. G. Pringle* 11439 (FM);

Zimapan, *L. A. Kenoyer A388* (FM); Actopan, *Bonpland* (type, Herb. Mus. Paris; phototype, AA, UI). VERACRUZ: Maltrata, Tlaxialle, *E. Kerber 251* (FM). OAXACA: Alturas de San Pablo Huitzo, *C. Conzatti 1976* (FM); vicinity of San Luis Tultitlanapa, *C. A. Purpus 3231* (FM). GUATEMALA. GUATEMALA: near Finca La Aurora, *Ignacio Aguilar 35* (FM); on the road between Guatemala and San Raimundo, *P. C. Standley 62941* (AA, FM). SACATEPEQUEZ: Finca El Hato, northeast of Antigua, *P. C. Standley 61154* (FM); near Antigua, *P. C. Standley 61680, 63821* (FM); San Juan, *Jesús Morales Ruano 1375* (FM); Cerro de la Cruz, above Antigua, *P. C. Standley 63330* (AA, FM); Cuesta de las Canas, above Antigua, *P. C. Standley 58913* (AA, FM); near Pastores, *P. C. Standley 59898, 59951* (FM).

2. *Malacomeles nervosa* (Decaisne) comb. nov. *Cotoneaster nervosa* Decaisne, *Nouv. Arch. Mus. Paris* 10: 177. 1874. *Ame-lanchier denticulata* var. *psilantha* Schneider, *Ill. Handb. Laubh.* 1: 743. 1906. *Amelanchier denticulata* var. *nervosa* Schneider, *op. cit.* 744, f. 416, 417. 1906. *Nagelia denticulata* var. *nervosa* Schneider in Fedde, *Rep. Nov. Spec.* 3: 183. 1907. *Nagelia denticulata* var. *psilantha* Schneider, *op. cit.* *Cotoneaster denticulata* var. *latifolia* Hemsley, *Biol. Central Am.* 1: 380. 1880, *nom. nud.* *Amelanchier paniculata* Rehder, *Jour. Arnold Arb.* 16: 449. 1935.

Shrubs 1–3 m. tall; young twigs densely whitish tomentose, tardily glabrate; winter buds densely tomentose; leaves persistent, coriaceous, elliptical to oval, conduplicate in the bud; upper surfaces green, glabrate, glossy, the lower surfaces densely whitish tomentose throughout; mature blades 1.5–5 cm. long, 8–25 mm. wide, the apex acute or obtuse, mucronulate, the base cuneate to rounded; lateral veins 10 to 15 pairs, rather obscure or somewhat impressed on the upper surface, prominent on the lower side; margins remotely and minutely denticulate, the teeth 7–9 per cm., and 6 to 25 on each side of average blades of the flowering and fruiting branches; stipules small, subulate; petioles 5–10 mm. long, densely tomentose; inflorescence terminal or axillary, corymbose, or rarely somewhat paniculate, the pedicels 2–4 mm. long, whitish tomentose; bracts persistent, linear-lanceolate, carinate, green, tomentose on back and margins, 3–4 mm. long; hypanthium loosely floccose, becoming glabrous, somewhat funnel-form, 4–5 mm. long, 5–6 mm. in diameter; petals 5, white, broadly oval or suborbicular, abruptly contracted at the base, somewhat concave, veiny, 5–6 mm. long, 4–5 mm. wide, with a small tuft of hairs on the very short (0.5 mm. long) claw; stamens about 20, unequal; anthers cordate-ovate, 2 mm. long; sepals triangular-ovate, acute, dorsally glabrous, tomentose within, acute, mucronulate, 3 mm. long, about 3 mm. wide, microscopically glandular-denticulate, the glands few, dark-colored; styles five, 3–4 mm. long, glabrous, free to the base; summit of the ovary densely



white-tomentose; ovary inferior, each locule with 2 ovules separated by a false partition; fruits ellipsoid or subglobose, puberulent at first, glaucous, 8-12 mm. in diameter, edible, 6 or more loculed, 4 or more seeded; calyx-lobes persistent, ascending or reflexed, glabrous on both sides or sparsely pubescent within, the margins ciliate; seeds reddish brown, smooth or minutely striate, 3.5-4 mm. long, obliquely lanceoloid or narrowly ovoid.

Type locality. "Regno Mexicano, Prov. Chiapa—fl. february (Linden 1840); Karwinski (herb. Imp. Petrop.)."

Range. Nuevo Leon, Mexico, to Huehuetenango, Guatemala.

Citation of specimens. MEXICO. NUEVO LEON: southwest of Puebla Galeana, C. H. and M. T. Mueller 282 (AA, type of *Amelanchier paniculata*; isotype, FM); about 15 miles southwest of Galeana, C. H. and M. T. Mueller 834 (AA); Hacienda Pablillo, Galeana, Mary Taylor 152 (FM). TAMAULIPAS: Juamave, H. W. von Rozynski 518 (FM); Tula, J. Gregg 599 (GH, syntype of *Amelanchier denticulata* var. *psilantha*). SAN LUIS POTOSI: without definite locality, J. G. Schaffner 460 (AA, FM). CHIAPAS: locality unknown, Linden in 1840 (type, Herb. Mus. Paris; phototype, AA, UI). STATE UNKNOWN: Sessé and Mocino 1012, 2128 (FM). GUATEMALA. HUEHUETENANGO: Chiantla, A. F. Skutch 1125, 1145 (AA, FM), P. C. Standley 65666 (FM); along Aguacatan Road, east of Huehuetenango, P. C. Standley 81964 (FM). STATE UNKNOWN: San Martin (?), J. R. Johnston 1750 (FM).

Department of Botany,  
University of Illinois, Urbana.

## DISEASES OF FREMONTIA

H. N. HANSEN AND H. EARL THOMAS

The plants of the genus *Fremontia*, a native of the southwestern United States are highly esteemed by many as ornamental subjects for garden and park and no doubt would be much more widely planted except for certain diseases to which they are susceptible, particularly the first of those treated below.

### STEM GIRDLING

This disease, caused by the soil-inhabiting water mold *Phytophthora cactorum* Lib. and Cohn., was first brought to our attention in 1934 because of rather heavy losses in young nursery stock. Since that time it has been seen rather frequently in cultivated specimens of varying size up to fifteen feet or so in height. We have not seen the disease on plants in the wild. The principal effect of this disease is the killing of the bark entirely around the stem commonly at or near the ground line but occasionally higher up. The death of the bark is soon followed by withering of all parts distal to the necrotic portion.

The disease was easily induced artificially by inoculation of pot-grown plants with the fungus taken from pure cultures. If the fungus is introduced through wounds, stems about one-half inch in diameter may be completely girdled in forty-eight hours. Even when the fungus is merely placed in contact with uninjured bark, such small plants are often killed within a few days. Plants of three species of *Fremontia*, *F. californica* Torr., *F. napensis* Eastw. and *F. mexicana* (Dav.) Macbr., appear to be about equally susceptible.

The prevalence and destructiveness of this disease seem to be clearly related to excess water and inadequate drainage. At least some of the losses could be avoided by planting in exceptionally well-drained sites and by sparing use of water.

#### VASCULAR WILT

Another soil-borne fungus, *Verticillium albo-atrum* R. and B., occasionally infects *Fremontia* plants grown under cultivation. The mycelium of this fungus invades seemingly uninjured roots and eventually pervades most of the xylem elements even those of the petioles and leaf veins. The stele is distinctly discolored (pl. 3, fig. A) while the bark appears unchanged. Infected plants are at first stunted and the leaves wilt and soon drop off (pl. 3, fig. B). Death of small plants ensues in three to five months. The disease was produced by artificial inoculation in plants of the three species named above. It has not been seen in plants in their native habitat. No satisfactory control is known.

#### LEAF SPOT

This disease, caused by the fungus *Hendersonia Fremontiae* (Hark.) comb. nov. (*Ascochyta Fremontiae* Hark.), produces small to large necrotic areas in the leaf blade with typically dark to black margins (pl. 3, fig. D). Harkness (Fungi of the Pacific Coast. Bull. Calif. Acad. Sci. 2: 438-447. 1887.) discovered the disease in 1881 and described the causal organism as follows: "Hypophyllous, scattered, minute, spores pale brown, nearly cylindrical, slightly attenuated at the ends, flexuous, 1-septate, but often appearing 3-septate by division of the endochrome, very unequal in size,  $6-12 \times 30-40 \mu$ , covering the lower surface of the living leaves of *Fremontia californica*." This description is excellent and enables one to identify the fungus on sight. The three-septate condition of the spores, however, is real and not merely an optical illusion. This becomes clear when the fungus is grown in culture where spores having up to five clearly visible septa are produced. The pale brown color alone would preclude the inclusion of this fungus in the genus *Ascochyta*. The color and multi-septate condition of the conidia and other characteristics place this fungus in the form genus *Hendersonia*. The disease has been found on *Fremontia californica* and *F. napensis* in nature and has





PLATE 3. DISEASES OF FREMONTIA. Fig. A. Longisections through stems of *Fremontia* showing discolored stele of infected plant (right) and stele of healthy plant (left),  $\times 1$ . Fig. B. *Verticillium*-infected plant (left), control (right),  $\times 1/5$ . Fig. C. Leaf of *Fremontia californica* showing angular leaf spot, *Septoria angularis*,  $\times 1$ . Fig. D. Leaf of *Fremontia napensis* affected by *Hendersonia* leaf spot: ventral view showing pycnidia (upper); dorsal view showing black margins of leaf spots (lower).

been produced on these and on *F. mexicana* by artificial inoculation. The injury is seldom severe.

#### ANGULAR LEAF SPOT

A species of *Septoria* was found to produce small, angular, brown leaf spots (pl. 3, fig. C) which may coalesce to form rather large necrotic areas. Premature defoliation may result where overhead sprinkling is practiced. The small, black pycnidia of the fungus are produced in dense groups beneath the epidermis of the ventral surfaces of the leaves and eventually the ostioles break through to the surface. Conidia from the leaf are one- to three-septate, mostly one-septate, whereas from culture they are one- to many-septate. This fungus does not seem to have been previously described and we therefore submit it as a new species.

*Septoria angularis* sp. nov. Maculis irregularibus angulatis, fuscis; pycnidiis epiphyllis, subepidermicis, dense gregariis, globosis, 50–70  $\mu$  diam., ostiolo minuto perforatis; sporulis oblongis utrinque attenuatis, 1–3-septatis, non constrictis, hyalinis, 10–17  $\times$  1.5–2  $\mu$ ; sporophoris papilli formibus. Hab. in foliis *Fremontiae* (Sterculiaceae) Amer. Bor.

Type. On leaves of *Fremontia mexicana* (Davidson) Macbride; nursery in Morgan Hill, Santa Clara County, California, May, 1935, Harvey E. Thomas (Herbarium of the University of California no. 688926).

This leaf spot was found also on *Fremontia* growing in a garden of native plants at Santa Barbara. It has been produced by artificial inoculation on the three species of *Fremontia* mentioned above.

Division of Plant Pathology,  
University of California, Berkeley.

#### NOTES ON THE GENUS ELYMUS

FRANK W. GOULD

Relationships in the *Elymus triticoides*—*E. condensatus*—*E. cinereus* complex of western North America never have been satisfactorily explained, especially in respect to the plants of coastal California. Hitchcock (1) more or less arbitrarily distinguished two species but recognized the possibility of a third entity in the "giant rye grass" of southern California. His discussion of *E. condensatus* is concluded with the statement, "On the coast of California there is a form with robust culms as much as 3 m. tall, compound spikes as much as 30 cm. long and 4 cm. thick, the ascending compound branches sometimes 6 cm. long. This form usually has pronounced rhizomes; possibly distinct." The type of *E. condensatus* from "Monte-Rey, California" has not been examined



(it was at Prague at the outbreak of the war) but from the type description and a photograph of the type sheet it may be judged to be the "form" characterized by Hitchcock. There is sufficient evidence to indicate that plants of the Great Basin area which have been referred to *E. condensatus* constitute a distinct species, the correct name for which is *E. cinereus* Scribn. & Merr.

Recent investigation utilizing data from studies of polyploidy in this group have clarified our understanding of species relationships and also have contributed to our knowledge of subspecific differentiation. Tetraploids ( $2n = 28$ ) are known in all three species; hexaploids are found in *E. triticoides*, and octoploids in *E. condensatus* and *E. cinereus*. Diploids have not been found in these nor any other North American species of *Elymus*. Differences in chromosome number are for the most part accompanied by morphological differences but notable exceptions exist in *E. triticoides* hexaploids, some of which closely resemble the tetraploids. In respect to distribution, *E. condensatus* and *E. cinereus* have separate ranges and different habitat preferences from each other (fig. 1) but the extremely polymorphic *E. triticoides* is widely distributed throughout the ranges of the other two, often growing intermingled with them.

In the following amplified descriptions, notes, and key our understanding of relationships in this group is presented.

- |  |  |
|--|--|
| Culms 6-10 mm. in diameter at base; leaves 15-35 mm. broad; spikelets 8 to 40 at a node (including those on branchlets) .....                                      | 1. <i>E. condensatus</i>                           |
| Culms 6 mm. or less in diameter; leaves 3-15 mm. broad; spikelets 1 to 6 at a node, rarely more.   |  |
| Culm nodes (or vicinity of nodes) with fine, usually dense pubescence; plants non-rhizomatous .....  | 2. <i>E. cinereus</i>                              |
| Culm nodes glabrous; plants rhizomatous.   |  |
| Culms 2-3.5 mm. in diameter; leaf blade 3 to 6 mm. broad; spikes with 1 to 2 occasionally 3 spikelets at a node; spikelets 8-15 mm. long with 3 to 6 florets ..... | 3. <i>E. triticoides</i>                           |
| Culms 3.5-5 mm. in diameter; leaf blade 6-15 mm. broad; at least some nodes of spike with 3 to 6 spikelets, or spikelets 17-25 mm. long with 6 to 9 florets .....  | 4. <i>E. triticoides</i> subsp. <i>multiflorus</i> |

# 1. ELYMUS CONDENSATUS Presl, Rel. Haenk. 1: 265. 1830.

Perennial; culms stout 1.5-3.5 m. tall, usually in dense clumps; rhizomes short, thick, generally produced along the margins of clumps; leaf blades often more than 2 cm. broad, glabrous or with fine silvery pubescence, exceptionally tough and fibrous; spikes 15-40 cm. long, with numerous, often compound, erect branchlets bearing one to many spikelets; spikelets relatively small, 10-15 mm. long, 3- to 6-flowered; florets frequently sterile, often not maturing; glumes subulate or flat and narrow, equal to or slightly

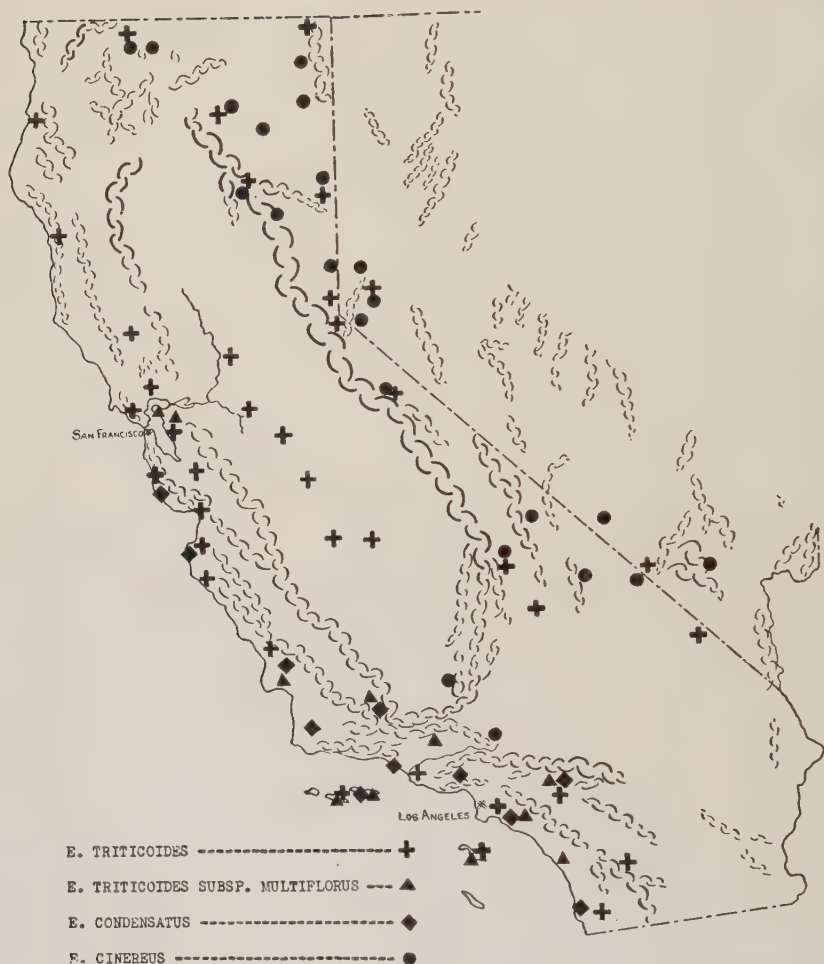


FIG. 1. Distribution of *Elymus condensatus* and *E. triticoides* subsp. *multiflorus*, and the California range of *E. triticoides* and *E. cinereus*.

shorter than the spikelet; lemmas usually with a rather broad hyaline margin, short-awned or acute.

Santa Cruz County, California, south along the coast and on coastal islands to Lower California, inland to southwestern Kern County and the western tip of San Bernardino County.

This giant *Elymus* occurs on dry slopes and open woodlands and characteristically is a bunchgrass with culms in clumps of from ten to fifty. On both the eastern and western slopes of the coastal mountains north of Los Angeles, plants that presumably are seed-



lings form dense stands on recently burned slopes. Little is known concerning the range or morphological characteristics of the tetraploid and the octoploid segregates of *E. condensatus*. Differences in rhizome production, culm, leaf and spike dimensions, leaf pubescence, and fertility have been observed in the species and some of these may be found to be associated with chromosome number.

2. *ELYMUS CINEREUS* Scribn. & Merr. Bull. Torrey Bot. Club 29: 467. 1902. *E. condensatus* Presl. var. *pubens* Piper, Erythea 7: 101. 1899.

Caespitose perennial; culms usually 0.6–2 m. tall, pubescent or glabrous except for a fine, often microscopic pubescence on or in the vicinity of the nodes; leaf sheaths and blades pubescent or glabrous, frequently glaucous; spikes usually 10–20 cm. long, with 2 to 5 (rarely more) spikelets at a node, the central spikelets occasionally short-pedicelled; rachilla usually hairy, especially at the nodes; florets 3 to 6 in a spikelet; glumes subulate, about as long as the first lemma; lemmas pubescent or hairy at least on the upper portions, the apices bifid or obtuse, awnless or short-awned; palea usually with a dense tuft of hairs near the bifid apex.

Saskatchewan to British Columbia, south to New Mexico and California, in the latter state ranging chiefly east of the Sierra Nevada and not occurring in the Great Valley or immediately along the coast.

*Elymus cinereus* grows on dry slopes and plains in the desert mountain ranges of California from near sea-level to 7000 feet or higher. It is a plant of the Upper Sonoran zone and is frequent in *Artemisia tridentata* associations. The type collection from Pah-rump Valley, Nevada (*C. A. Purpus* 6050) is densely pubescent. The same form occurs in California, Oregon, and Washington and in the latter state has been recognized as *E. condensatus* var. *pubens* Piper. At least some of this extremely pubescent material is known to be octoploid but the extent to which this character is associated with the octoploid genotype has not been determined. A large extremely glabrous form of this species lacking even nodal pubescence in some specimens has been collected in Washington and Oregon. In the opinion of the writer this probably represents the hexaploid genotype although proof is lacking at present.

3. *ELYMUS TRITICOIDES* Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 99. 1863. *E. Orcuttianus* Vasey, Bot. Gaz. 10: 258. 1885.

Culms single or in small clusters, glabrous or rarely with a fine pubescence on the upper internodes, glaucous especially at the nodes; rhizomes extensive, the internodes long and slender; leaves glabrous or sparsely hairy, rarely pubescent, glaucous or less frequently bright green; spikes 8–20 cm. long; spikelets sessile or rarely on short pedicels; glumes subulate or flat and

narrow, as long as or shorter than the first lemma; lemmas smooth or scabrous, short-awned from an acute or minutely bifid apex.

Montana and Washington south to Texas and Lower California and on the coastal islands of southern California.

*Elymus triticoides*, a plant of exposed slopes and valleys, is the only member of the genus to flourish as a weed of city lots and roadsides in the Western United States. The typical form, with slender culms, narrow leaves, and spikes that have only 1 or 2 spikelets at a node, is composed of both tetraploid and hexaploid populations. This form was at first thought to be entirely tetraploid and probably is predominately so when the entire range of the species is considered. Chromosome counts of several colonies of typical *E. triticoides* in the suburban district between Los Angeles and Long Beach indicate that here the hexaploid is more abundant. Population studies have disclosed a number of differences between the morphologically indistinguishable tetraploids and hexaploids in this region. The former flower two to three weeks earlier, have a pollen maturation of 75 to 98 per cent instead of 5 to 35 per cent, and have an average stomatal length and pollen grain size that is 15 to 20 per cent less than that of the hexaploids.

4. *ELYMUS TRITICOIDES* Buckl. subsp. **multiflorus** subsp. nov.

Culmi glabri 3.5–5 mm. diametro; laminae luminosae viridae, glabrae, 6–15 mm. latae; spicae magnae, irregulares, aliqui nodi cum 3 ad 6 spiculae, aut spiculae 17–25 mm. longae; spiculae saepe in brevibus ramis, cum 6 ad 9 florae.

Culms stout, frequently in dense clumps; rhizomes thicker and less extensive than in the species; blade usually bright green, glabrous, broad; spikes large, irregular, the spikelets, when crowded, frequently on short pedicels; florets highly sterile; glumes longer than in the species, usually exceeding the first lemma.

Type. Near San Francisco Bay at Albany, Contra Costa County, California, July 4, 1941, *Frank W. Gould 1304* (University of California Herbarium no. 686616).

This large hexaploid occurs in dense stands along the coastal region of central and, to a lesser extent, southern California. Although belonging to the *E. triticoides* complex it has numerous characters in common with the giant *E. condensatus* which occupies a similar range. Dr. G. L. Stebbins, Jr., of the University of California, who has done much of the preliminary cytological work on this group, believes the large hexaploid in general possesses two genomes of *E. triticoides* with one of *E. condensatus*. A logical assumption is that *E. triticoides* subsp. *multiflorus* is comprised of allopolyploids and that hexaploids of the typical form of the species are autopolyploids. Whatever their genetical constitution, it is quite apparent that these hexaploids have had a polyphyletic origin.



It is the intent of the writer to ascribe to subsp. *multiflorus* only those plants which are morphologically characteristic. It is expected, however, that all specimens referable to this group will have a somatic chromosome number of 42.

The following records of chromosome counts have been utilized in this study. These are taken from Stebbins and Love's paper (2) and from previously unpublished data of Dr. Stebbins and the writer. The writer is greatly indebted to Dr. Stebbins for his cooperation and helpful criticism during the course of this study.

*Elymus condensatus* Presl.

( $2n = 28$ ) CALIFORNIA. Ventura County: *Stebbins 2864*. Los Angeles County: *Stebbins 2859*.

( $2n = 56$ ) CALIFORNIA. Ventura County: *Gould 2357*. Los Angeles County: *Gould 2344*.

*Elymus cinereus* Scribn. & Merr.

( $2n = 28$ ) OREGON. Grant County: *Soil Conservation Service no. W 5754-40P*. Baker County: *Soil Conservation Service no. W 5754* (counts by Stebbins).

( $2n = 56$ ) WASHINGTON. Whitman County: *Soil Conservation Service no. W 3335* (seed). UTAH. Iron County: Cedar Breaks National Monument, *W. S. Boyle* (counts by Stebbins).

*Elymus triticoides* Buckl.

( $2n = 28$ ) CALIFORNIA. Plumas County: *Stebbins 2923*. Marin County: *Gould 1299*. Contra Costa County: *Gould 1271, 1284, 1286*. Alameda County: *Stebbins 2702, 2753; Gould 1283*. San Mateo County: *Gould 1292*. San Benito County: *Stebbins 2754, 2755*. Merced County: *Stebbins 2800*. Los Angeles County: *Gould 2173, 2331, 2332, 2340, 2343*.

( $2n = 42$ ) CALIFORNIA. Merced County: *Stebbins 2797*. Los Angeles County: *Gould 2335, 2339, 2341, 2346*.

*Elymus triticoides* Buckl. subsp. *multiflorus* Gould.

( $2n = 42$ ) CALIFORNIA. Contra Costa County: *Gould 1279, 1288, 1291*. Kern County: *Stebbins 3010*. Los Angeles County: *Stebbins 2858; Gould 2333, 2334*.

Compton Junior College,  
Compton, California.

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2. STEBBINS, G. L., JR., and R. M. LOVE. A cytological study of California forage grasses. Am. Jour. Bot. 28(5): 371-382. 1941.

# NOTEWORTHY PLANTS OF TEXAS. IV. PEDIOMELUM RYDBERG

B. C. THARP AND FRED A. BARKLEY

In considering the *Psoraleae* in the North American Flora (24: 17-24. 1919), Rydberg segregated a series of species from the genus *Psoralea*, the group being characterized by having deep-seated, tuberous, edible roots, and a long-beaked pod which bursts more or less irregularly around the middle. The series centered about the well known species *Psoralea esculenta* Pursh and was treated as the genus *Pediomelum*, with *P. esculentum* (Pursh) Rydb. as its type.

In reviewing this group as it occurs in Texas, it seems that the segregation of these species into *Pediomelum* is satisfactory. Of the twenty-two species which Rydberg treated, ten are found to occur in the state. In addition to these, three other well-marked species hitherto undescribed were noted.

The general position of these three may be seen from the appended key to the thirteen Texan species:

Rachis not produced beyond the first leaflets; leaves therefore truly digitate; calyx and claw of the banner long.

Stem usually comparatively tall, 2-10 dm. high, leafy.

Plant with comparatively short, mostly appressed pubescence.

Leaflets linear; bracts shorter than the calyx ..... *P. cyphocalyx*

Leaflets oblong, oblanceolate, or obovate; bracts usually as long as the calyx or longer.

Bracts broadly ovate, enclosing the calyx ..... *P. Reverchonii*

Bracts lanceolate or linear-lanceolate, not enclosing the calyx.

Bracts ovate-lanceolate, acuminate, rarely as long as the calyx.

Bracts 10-15 mm. long; stipules ovate; plant little branched above ..... *P. cuspidatum*

Bracts 7-10 mm. long; stipules lanceolate; plant much branched above ..... *P. Parksii*

Bracts linear-lanceolate, caudate-attenuate, 15-20 mm. long, often much exceeding the calyx; stipules lanceolate; plant often much branched above ..... *P. caudatum*

Plant with long spreading pubescence ..... *P. esculentum*

Stem very low (plant often subcaulescent), usually less than 1 dm. high, sometimes with the lower branches elongate, 1-2 dm. long and prostrate.

Plant hirsute; lowest calyx-lobe slightly broader than but scarcely longer than the rest; seeds smooth .... *P. subulatum*

Plant appressed-strigose; lowest calyx-lobe much broader and longer than the rest; seeds reticulate.

Peduncles much shorter than the petioles, scarcely longer than the spikes; root oblong-fusiform; lowest calyx-lobe ovate-lanceolate; stem short ..... *P. hypogaeum*

Peduncles often equaling the petioles, three to four times as long as the spikes; root globose; lowest calyx-lobe narrowly lanceolate; subcaulescent .. *P. scaposum*

Rachis produced beyond the first leaflets, usually bearing one or more terminal leaflets.

Leaflets 3 or 5.

Plant caulescent; spikes few-flowered; corolla less than 10 mm. long.

Stipules lanceolate; bracts lanceolate; plant sparsely strigose ..... *P. rhombifolium*

Stipules deltoid; bracts ovate; plant densely strigose .. *P. Coryi*

Plant subcaulescent; spikes many-flowered; corolla 15 mm. long or more ..... *P. humile*

Leaflets 5 or more, stem short; flowers many ..... *P. Goughae*

A discussion of the previously undescribed species follows.

**Pediomelum Parksii**<sup>1</sup> sp. nov. Herba perennis; radicibus fusiformibus; caulibus 3–6 dm. altis parce strigosis teretibus; foliis 5-foliolatis; stipulis subulatis, 5–9 mm. longis, submembranacis, glanduloso-punctatis, persistentibus; petiolis 1.5–4 cm. longis, striatis, strigosis; foliolis subsessilibus, 1.5–3.5 cm. longis, 7–18 mm. latis, late rhombeo-obovatis, supra glabris et subter sparse strigosis, glanduloso punctatis supra et subter, apice truncato et mucronato, basi late cuneata, margine strigoso-ciliolatis; pedunculis 3–6 cm. longis, striatis, strigosis; spicis densis, 4–8 cm. longis; bracteis ovato-lanceolatis, caudato-attenuatis, 7–10 mm. longis, calyce subequali; calyce glanduloso-punctato, tubis circa 5 mm. longis, 5 mm. latis, quattuor lobis superioribus lanceolatis, longioribus quam tuba lobo inferiore lato-lanceolato, acuminato, bis longiore quam tuba, marginis dense pilosis; corollis 15 mm. longis; legumine ovoideo, muro tenui, glanduloso-punctato, proboscide subaequalissimo corpori.

Perennial with a tuberous root; stem 3–6 dm. high, sparsely strigose, terete, striate, with spreading branches above; leaves digitately 5-foliolate; stipules subulate, 5–9 mm. long, submembranaceous, sparingly strigose, ciliate, glandular-punctate, persistent; petioles 1.5–4 cm. long, striate, strigose; leaflets subsessile, 1.5–3.5 cm. long, 7–18 mm. broad, broadly rhombic-obovate, rounded at the apices and mucronate, broadly cuneate

<sup>1</sup> Harris Braley Parks was born at Carlinville, Illinois, June 10, 1879. B.S. from Blackburn College, 1900. Assistant Superintendent of the Sitka Training School, Alaska, 1905–1911; Professor of Natural Science at Palmer College, 1912–1917; extension entomologist of the Texas Agricultural and Mechanical College, 1918–1920; Secretary of the American Honey Producers League, 1921–1922; apiculturist, Texas Agricultural and Mechanical College, 1922–1926 and Chief of the Division of Apiculture since 1927.

His work in apiculture, together with an intense love for plants, has made him one of the foremost and most admired of modern collectors of Texas plants. Many of his collections in recent years have been made in collaboration with Mr. V. L. Cory. His collection is deposited in the S. M. Tracy Herbarium of the Texas Agricultural and Mechanical College.

It seems most fitting that another species should be named for this outstanding student of the Texas flora.

University of Texas Herbarium Biographical Sketch, V. B. C. Tharp and Fred A. Barkley.



at the bases, glabrous above, very sparingly strigose below, strigose-ciliate margined, minutely glandular-punctate above and below; peduncles 3–6 cm. long, striate, strigose; spikes dense, 4–8 cm. long; bracts ovate-lanceolate, caudate-attenuate, 7–10 mm. long, shorter than the calyx, sparsely pilose, minutely glandular-punctate; calyx glandular-punctate, sparingly hirsute; calyx tube about 5 mm. long, 5 mm. broad; calyx lobes densely pilose on margins, the upper four lanceolate, longer than the tube, the lowest broadly lanceolate, acuminate, twice as long as the tube; corolla 15 mm. long; banner obovate, slightly retuse at the apex; pod ovoid, thin-walled, glandular-punctate, sparsely strigose above, beak half as long as the body.

Type. Childress County, Texas, July, 1929, *Biology Class s.n.*, Herbarium of the University of Texas.

As we interpret the much confused situation in regard to the similar species, *P. cuspidatum* (Pursh) Rydb. and *P. caudatum* Rydb., the former is a little-branched plant with ovate stipules and bracts ovate-lanceolate, acuminate, 10–15 mm. long, rarely as long as the calyx, while the latter inclines toward being much branched above with lanceolate stipules and bracts linear-lanceolate, caudate-attenuate, 15–20 mm. long, often much exceeding the calyx. *P. Parksii* closely resembles *P. caudatum* in general aspect, but has leaflets more broadly obovate (or rarely rhombic-obovate), more obtuse, and with the mucro much less conspicuous. The inflorescence is longer, the calyx is much broader in proportion to its length, and the bract is broadly ovate, short acuminate and much shorter than the calyx.

*Pediomelum Goughae*<sup>2</sup> Tharp and Barkley sp. nov. Herba perennis; radicibus farinosis, fusiformibus; caulibus cum multis persistentibus cataphyllis subterraneis, aëriis brevissimis cum foliis multis, dense longo-strigosis; foliis palmato-compositis cum 4 ad 7 foliolis, usitate rhachidibus extensis 1–5 cm. longis cum

<sup>2</sup> Lula C. Gough (pronounced "göf"), daughter of Wm. Mason and Fannie Faulkner Gough, born at Ft. Worth, Texas, November 26, 1880, educated in the Sherman (Texas) Public Schools. B.A., Denton Teacher's College; M.A., University of Texas. Collections of plants made largely between 1918 and 1925 have been deposited in the Herbarium of John Tarleton Agricultural College and in the Herbarium of the University of Texas. It is a pleasure to dedicate this species to Miss Gough, whose collections in her area of the state, like those of several others of our coworkers, are of inestimable value to our study of the Texas flora.

University of Texas Herbarium Biographical Sketch, VI. B. C. Tharp and Fred A. Barkley.

#### EXPLANATION OF THE FIGURES. PLATE 4.

PLATE 4. TYPE SPECIMENS OF THE GENUS *PEDIOMELUM*. A. *P. trinervatum*, vicinity of Chihuahua, Chihuahua, Mexico, June 5–10, 1908, *Edward Palmer 356*, Herbarium of the New York Botanical Garden. B. *P. Goughae*, Stephenville, Texas, April 12, 1921, *Lula C. Gough s.n.*, Herbarium of the University of Texas. Inserts represent camera lucida sketches of the bracts and calyces,  $\times 4$ .

PLATE 4. TYPE SPECIMENS OF THE GENUS *PEDIOMELUM*.

1 ad 3 foliolis palmatis ad apicem; stipulis lanceolatis, acuminate, 1–2.5 cm. longis, strigosis, persistentibus; petiolis circa 1 dm. longis, strigosis; foliolis ovatis vel rhombo-ovatis, truncatis vel acutis, ad basem cuneatis, strigosis supra et subter; pedunculis 10–13 cm. longis, strigosis; spicis densis, circa 4 cm. longis; bracteis ovatis, obtusis, 7 mm. longis, sparse longo-strigosis; calyce strigoso-canescens, tubo circa 3 mm. longo; quattuor lobis supra subulatis, attenuatis, circa 6 mm. longis, lobo infra oblanceolato, longo-acuminato, 1 cm. longo, 3-nervato obscuro; corolla caerulea, circa 1.1 cm. longa.

Perennial from a farinaceous root; stem below ground covered with ovate to lanceolate persistent cataphylls, stem above ground very short with many leaves and several short flowering branches, densely long strigose; leaves with 4 to 7 leaflets palmately arranged and usually with an extension of the rachis 1–5 cm. long bearing 1 to 3 additional leaflets palmately arranged; stipules lanceolate, acuminate, 1–2.5 cm. long, strigose, persistent; petioles about 1 dm. long, strigose; leaflets ovate or rhombic-ovate, rounded to acute, cuneate at the bases, strigose on both surfaces; peduncles 10–13 cm. long, strigose; spikes about 4 cm. long, dense; bracts ovate, obtuse, 7 mm. long, sparsely long strigose; calyx long strigose-canescens; tube about 3 mm. long; upper four calyx-lobes subulate, attenuate, about 6 mm. long, the lowest one oblanceolate, long-acuminate, 1 cm. long, obscurely 3-nerved; corolla bluish, about 1.1 cm. long.

Type. Stephenville, Erath County, Texas, April 12, 1921, *Lula C. Gough s.n.*, Herbarium of the University of Texas. (This specimen erroneously bears the date October 12, but checking with a duplicate specimen in John Tarleton Agricultural College Herbarium shows that the date should have been April 12.)

An additional specimen, Post, Garza County, Texas, July 9, 1941, *B. C. Tharp s.n.* in the University of Texas Herbarium, has been examined.

This species in many respects is similar to *P. trinervatum* Rydb. of New Mexico and Chihuahua, the type of which upon close examination clearly shows the terminal leaflet is borne upon an extension of the rachis beyond the lowermost leaflets. *P. trinervatum* has a very large lower calyx lobe which is obovate and short acuminate with three very prominent ribs, while in *P. Goughae* the lowermost calyx lobe is oblanceolate and long-acuminate with three rather obscure nerves. The flower of the latter

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#### EXPLANATION OF THE FIGURES. PLATE 5.

PLATE 5. TYPE SPECIMENS OF THE GENUS *PEDIOMELUM*. A. *P. Coryi*, Katherine, Texas, March 22, 1907, *W. L. Bray & H. H. York 5*, Herbarium of the University of Texas. B. *P. Sonorae*, vicinity of Alamos, Sonora, Mexico, March 17, 1910, *J. N. Rose, Paul C. Standley & P. G. Russell 13025*, Herbarium of the New York Botanical Garden.



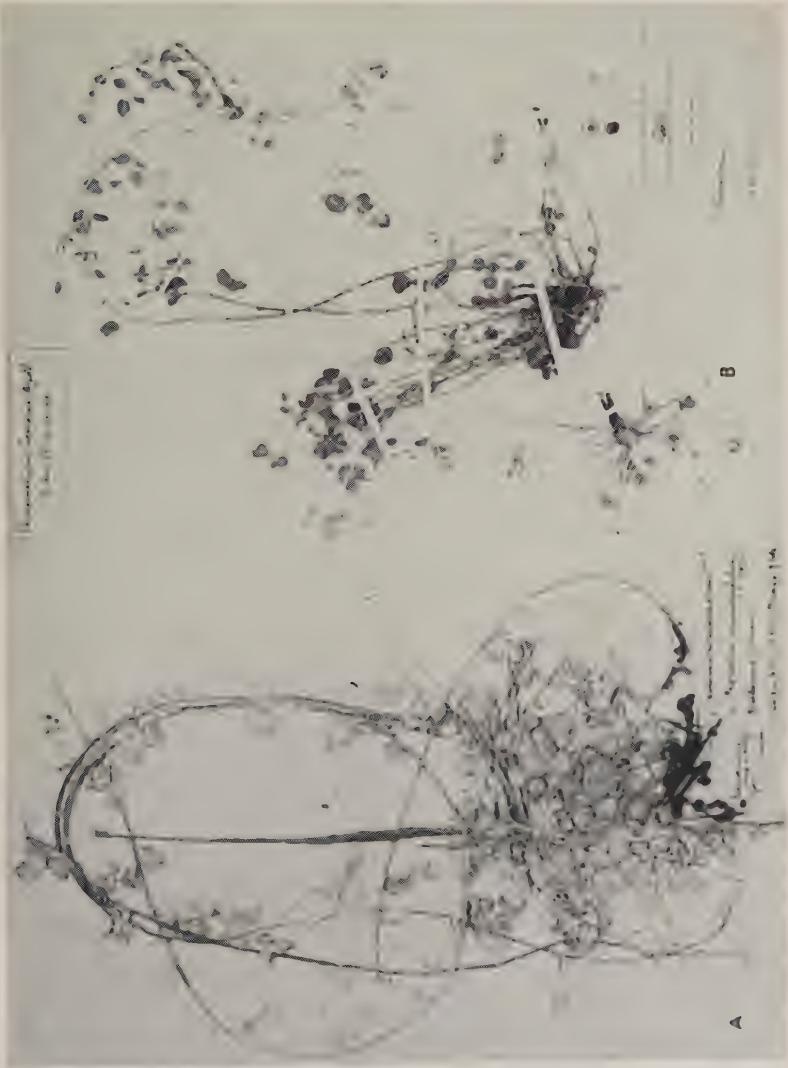


PLATE 5 TYPE SPECIMENS OF THE GENUS PEDIOMELUM.

species is less than half as large and the pubescence much longer than in the former species. The bracts of *P. Goughae* are broadly ovate, subacute or obtuse, while in *P. trinervatum* they are lanceolate, long acuminate.

**Pediomelum Coryi**<sup>3</sup> Tharp and Barkley sp. nov. Herba perennis; radicibus fusiformibus; caulibus ad basem ramosis, 1-9 dm. longis, decumbentibus, striatis, strigosissimis; foliis pinnate 3-foliolatis; stipulis deltoideis, 3-4 mm. longis, subglabris praeter margine longa-ciliolata; petiolis 1-3 cm. longis, striatis, strigosis; foliolis 5-15 mm. longis, 5-20 mm. latis, rotundis vel orbicularibus, canescentibus, foliolis lateralibus subsessilibus, petiolulis terminalibus 2-8 mm. longis; pedunculis 3-5 cm. longis, strigosis; spicis subcapitatis, floribus paucis; bracteis 1.5 mm. longis, rotundis, truncatis, sparse hirsutis, ciliolatis; calyce canescenti, 5 mm. longis, plus minusve gibberosis supra, lobis subaequalibus, lanceolatis, tubae subaequalibus; corolla purpurea, 6 mm. longa; leguminibus canescentibus, 1 cm. longis, corporibus ovatis, 5 mm. longis, proboscide curvo, circa 5 mm. longo.

Perennial with a deep-seated, farinaceous root; stem branching at base, 1-9 dm. long, decumbent and trailing, striate, densely strigose; leaves pinnately trifoliate; stipules deltoid, 3-4 mm. long, subglabrous except margin long-ciliate; petioles 1-3 cm. long, striate, strigose; leaflets 5-15 mm. long, 5-20 mm. broad,

<sup>3</sup> Victor Louis Cory, Range Botanist, Texas, Substation 14, Sonora, Texas, son of Philip Rose and Rebecca Smith Cory, born September 17, 1880, at Albia, Monroe County, Iowa. B.S., Kansas State College, 1904; M.S., University of Minnesota, 1923. Married Zenobia Frances Brian, January 20, 1917. One daughter, Edith Jean. Farm superintendent for the United States Department of Agriculture 1904-1912 and for the Texas Agricultural Experiment Station 1912-1917 and 1920-1922. Range Botanist for the Texas Agricultural Experiment Station since 1923.

He is widely travelled (Morocco, Sierra Leone, Liberia, Spain, and Mexico). His hobbies are mountain climbing and visiting historic spots in Texas. Outside of Texas he has collected plants in Wisconsin, Minnesota, Kansas, Oklahoma, New Mexico, and Arizona. His collection of Texas plants began in 1923, and since that time he has collected in most parts of the state. Much of his field work has been done in collaboration with H. B. Parks, some with Marcus E. Jones, P. A. Munz, and Simon E. Wolff. His collections are mainly deposited in the Tracy Herbarium of the Texas Agricultural and Mechanical College and in Gray Herbarium of Harvard University. As a result of his extensive field collections he has published many papers dealing with Texas flora.

It is indeed a pleasure to name this species for this student of the Texas flora.

University of Texas Herbarium Biographical Sketch, VII. B. C. Tharp and Fred A. Barkley.

#### EXPLANATION OF THE FIGURES. PLATE 6.

PLATE 6. TYPE SPECIMENS OF THE GENUS *PEDIOMELUM*. A. *P. Parksii*, Childress County, Texas, July, 1929, *Biology Class s.n.*, Herbarium of the University of Texas. B. *P. caudatum*, sandy soil, Dallas County, Texas, May J. Reverchon (*Curtiss 563*), Herbarium of Columbia University (at the New York Botanical Garden). Inserts show bracts and calyces,  $\times 4$ .

PLATE 6. TYPE SPECIMENS OF THE GENUS *PEDIOMELUM*.



rotund to orbicular, subcordate at the bases, truncate at apices, canescent, lateral leaflets subsessile, terminal petiolule 2–8 mm. long; peduncles 3–5 cm. long, strigose; spikes subcapitate, few-flowered; bracts 1.5 mm. long, rotund, truncate, sparsely hirsute, ciliolate; calyx canescent, 5 mm. long, slightly gibbous on the upper side, calyx lobes subequal, lanceolate, scarcely as long as the tube; corolla purplish, 6 mm. long; pod canescent, 1 cm. long, the body ovoid, 5 mm. long, the beak curved, about 5 mm. long.

Type. Katherine, Texas, March 22, 1907, *W. L. Bray* and *H. H. York* 5, University of Texas Herbarium.

An additional collection, Ottine, Gonzales County, Texas, April 11, 1926, *E. R. Bogusch* 1284, University of Texas Herbarium, has been examined.

This species most closely resembles *P. Sonorae* Rydb. from which it differs markedly in shape of leaf, pubescence, and fruit. Its nearest relative in Texas is *P. rhombifolia* (T. and G.) Rydb., from which it differs in being densely strigose, in having ovate-truncate leaflets and deltoid stipules, in having broadly ovate bracts and fewer flowers more densely arranged in the inflorescence.

The Herbarium, Department of Botany and Bacteriology,  
University of Texas, Austin.

## NOTES ON THE FLORA OF THE CHARLESTON MOUNTAINS, CLARK COUNTY, NEVADA. VI<sup>1</sup>

IRA W. CLOKEY

In the course of preparing the manuscript for the flora of the Charleston Mountains of Nevada, it has been found necessary to describe a new violet from the region and to make adjustments in the nomenclature of some of the species of several other genera. I am indebted to Mr. Milo S. Baker and to Dr. Jens Clausen for their interpretations of the violets of this area.

*EPHEDRA FASCICULATA* A. Nelson var. **Clokeyi** (Cutler) comb. nov. *E. Clokeyi* Cutler, Ann. Mo. Bot. Gard. 26: 402. 1939.

The range of the variety is cocentric with that of the species. Morphologically the variety is too close to *E. fasciculata* to warrant specific distinction, the two differing from each other principally in the size and shape of the fruit.

*ECHEVERIA PULVERULENTA* Nutt. subsp. **arizonica** (Rose) comb. nov. *Dudleya arizonica* Rose, Addisonia 8: 35. 1923. *Echeveria arizonica* (Rose) Kearney and Peebles, Jour. Wash. Acad. Sci.

<sup>1</sup> Previous notes in this series have appeared as follows: MADROÑO 4: 128–130. 1937; Bull. So. Calif. Acad. Sci. 37: 1–11. 1938; *ibid.* 38: 1–7. 1939; MADROÑO 6: 211–222. 1942; *ibid.* 7: 67–76. 1943.

29: 479. 1939, not *E. arizonica* Hort. ex Berger. 1930. *Dudleya pulverulenta* (Nutt.) Britton and Rose subsp. *arizonica* (Rose) Moran, Desert Pl. Life 15: 72. 1943.

Recent authors—Jepson, Kearney and Peebles, and Munz—do not consider *Dudleya* sufficiently separated from *Echeveria* to be recognized as a distinct genus. This is clearly presented by Jepson (Fl. Calif. 2: 111. 1936) who considers the California species as having close affinities with the Mexican species of *Echeveria*. As stated by Moran (*op. cit.*, p. 74) the subsp. *arizonica* is a reduced desert form of the species.

Representatives of the genus *Amelanchier* are abundant in the Charleston Mountains, in some places being the dominant shrubs. Locally they fall into what are usually considered three species, *A. utahensis*, *A. oreophila* and *A. Covillei* (*A. nitens*). Owing to the similarity of these three shrubs and the great abundance of intermediates, they are considered here as not worthy of being kept specifically distinct. The three entities can be distinguished as follows:

- |   |   |
|---|---|
| Shrub symmetrical; leaves acute or rounded at apex,<br>upper surfaces shiny; fruit fleshy.                        |   |
| Leaves pubescent; fruit purplish .....  | 1. <i>A. utahensis</i>                            |
| Leaves glabrous; fruit somewhat mealy, white or occasionally with a purple cheek .....                            | 2. <i>A. utahensis</i><br>subsp. <i>Covillei</i>  |
| Shrub not symmetrical; leaves ovate or obovate, rounded<br>at apex, dull, pubescent; fruit very juicy, purple ... | 3. <i>A. utahensis</i><br>subsp. <i>oreophila</i> |

1. AMELANCHIER UTAHENSIS Koehne, Gatt. Pomac. in Wissen. Beil. Progr. Falk-Real. Berlin 95: 25, pl. 2. 1890. *A. alnifolia* Nutt. var. *utahensis* (Koehne) Jones, Proc. Calif. Acad. Sci., ser. 2, 5: 679. 1895.

Colorado to Oregon, south to New Mexico, Arizona, southern Nevada and southeastern California. Local habitat, Juniper and lower Pinyon belts, at elevations between 1400 and 2100 meters. Widely scattered and locally the dominant shrub. Harris Springs road, Clokey 7543; Kyle Canyon, Alexander 535, Clokey 7541; 4 to 5 miles below public camp grounds (Kyle Canyon), Maguire 18086, 18087; Mountain Springs, Clokey and Anderson 7971; canyon east of Mountain Springs, Clokey 8564. Flowers in April and May; fruits in June.

In some areas, as along the ridge branch of the Harris Springs road, most of the plants are intermediate between the species and the subsp. *Covillei*, while along the old road from Kyle Canyon to Deer Creek, the shrubs are nearly all intermediate between the species and the subsp. *oreophila*.

2. AMELANCHIER UTAHENSIS Koehne subsp. *Covillei* (Standley) comb. nov. *A. Covillei* Standley, Proc. Biol. Soc. Wash. 27: 198.

1914. *A. nitens* Tidestr. *ibid.* 36: 182. 1923. *A. alnifolia* Nutt. var. *Covillei* (Standley) Jepson, Man. Fl. Pl. Calif. 510. 1925.

Eastern Inyo and San Bernardino counties, California, through southern Nevada to northern Arizona. Local habitat, in the Juniper Belt, at elevations of about 1200 meters, in washes and on hillsides. Wilson's Ranch, *Clokey* 8236, 8237, *McVaugh* 5966, *Maguire* 18045. Blooms in April; fruits in May and early June.

The type locality of *A. Covillei* is Cottonwood Springs, Panamint Mountains, Inyo County, California; that of *A. nitens* is Wilson's Ranch, Charleston Mountains, Clark County.

3. AMELANCHIER UTAHENSIS Koehne subsp. *oreophila* (A. Nels.) comb. nov. *A. oreophila* A. Nels. Bot. Gaz. 40: 65. 1905.

Montana south to New Mexico, Arizona and southern California. Local habitat, on steep hillsides and canyon bottoms, associated with *Cercocarpus ledifolius*, *Pinus monophylla* and *P. ponderosa* var. *scopulorum*, at elevations between 2100 and 2300 meters. Kyle Canyon, *Clokey* 7141, 7142. Flowers in May; fruits in August.

*Viola charlestonensis* Baker and Clausen, sp. nov. Herba geophyta depressa, 10 cm. alta vel minus, rhizomate erecto vel ascendenti cum radice valida altaque; caulibus 1-8, 1/2-2/3 longitudinis subterraneis cum 1 vel 2 nodis subterraneis, supra cum floribus foliisque dense confertis; foliis crassis, cinereis supra cum venis albidis, infra purpurascentibus; caulibus foliis pedunculisque pilis brevibus complanatis adpressis retrorsis subvestitis; foliis radicalibus paucis, rotundatis, late ovatis, obtusis, basi truncatis vel paulum cuneatis, integris, 1.1-2.3 cm. latis, 1-2.5 cm. longis, petiolis 4-6 cm. longis; foliis caulinis angustioribus, ovatis, apice acutioribus, basi cuneatis, 6-20 mm. latis, 8-25 mm. longis; stipulis foliorum radicalium scariosis, adnatis, alas in parte subterranea petioli formantibus; stipulis foliorum caulinarum griseis, lanceolatis, integris, 1-2 mm. longis; bracteolis subulatis, integris, prope medium pedunculi, 1.5-2.5 mm. longis; floribus numerosis, omnino petaliferis, saepe infertilibus; sepalis lineari-lanceolatis, vix auriculatis, 3.5-4 mm. longis, incanis processibus brevibus, albis, adpressis piliformibus; corolla 12-17 mm. diametro, flava supra, manifeste fuscata in dorso petalorum superiorum; petalis superioribus et lateralibus late obovatis, lateralibus clavate barbatis; petalo inferiore late spatulato, truncato, brevior quam lateralibus petalis, cum brevi calcare processibus piliformibus vestito per calcarem ad medium petali extendentibus, petalo et calcare 8-11 mm. longo; ovario et basi styli dense muriculata; stylo 2.1 mm. longo; orificio stigmatis terminato tubo in gemma, in aeta terminato labro minuto; capsula per magna, truncata, latitudine et longitudine aequali, dense puberulenta, facie circa 8 mm. diametro; seminibus nigris, circa 2.1 mm. latis, 3.4 mm. longis; caruncula laeve, vix perspicua.



A depressed geophyte, not more than 10 cm. high; rootstock erect or ascending with a strong and deep tap root and branches, supplemented by a few roots springing from the rootstock; stems one to eight, one-half to two-thirds subterranean, one to two nodes below the ground, densely crowded above with leaves and flowers; leaves thick, ashy above with whitish veins, purplish beneath with an almost complete layer of short, appressed and retrorse hairs on both sides of the leaves, as well as on petioles, stems, and peduncles; radical leaves few, rounded, broadly ovate with blunt tip, and a truncate or slightly cuneate base, entire, 1.1–2.3 cm. wide, 1–2.5 cm. long, on petioles 4–6 cm. long; cauline leaves narrower, ovate, mostly with somewhat sharper point and cuneate base, 6–20 mm. wide, 8–25 mm. long; stipules of radical leaves scarious, adnate, forming wings on the subterranean part of petiole, the minute limb near the ground surface; stipules of cauline leaves grayish, lanceolate, entire, 1–2 mm. long; bractlets subulate, entire, above or below the middle of the peduncle, 1.5–2.5 mm. long; flowers abundant, wholly petaliferous, mostly infertile; sepals linear-lanceolate, scarcely auricled, 3.5–4 mm. long, hoary with short, white, appressed, hair-like processes; corolla 12–17 mm. across, yellow on the face, but conspicuously darkened on the backs of upper petals, and faintly on the backs of lower petals; upper and lateral petals broadly obovate, lateral with clavate beards; lower petal broadly spatulate, truncate, shorter than lateral petals, with a short spur covered with hair-like processes extending along the spur to middle of petal, 8–11 mm. including spur; ovary and base of style densely muriculate; style 2.1 mm. long, form and bearding as in group; stigmatic orifice bounded in bud by a tube, in age by minute lip; stamen-sheath as in group; capsule unusually large, truncate, as wide as long, densely puberulent, ca. 8 mm. across each face; seeds black, ca. 2.1 mm. wide, 3.4 mm. long, weight of mature seeds unknown; caruncle smooth, scarcely evident, smallest in *Nuttallianae*.

Type. Forest Service camp no. 1, Charleston Mountains, Clark County, Nevada, *Clokey 7501*. The type specimen is deposited at Pomona College Herbarium, Claremont, California; isotypes are widely distributed.

This species is known to occur only in the Charleston Mountains at elevations from 7500 feet to 9500 feet and in Zion National Park, Utah.

Citation of specimens. NEVADA. Charleston Mountains, Clark County: Forest Service camp no. 1, *Clokey 7502*, *Baker 8690*; Lee Canyon, 9000 feet, *Clokey 7504*, *Baker 8696*; Charleston Park, 8825 feet, *Clokey 7503*; yellow pine forest, 9500 feet, June 20, 1926, *Jaeger*; ridge, south side of Lee Canyon in limestone, 8600 feet, July 25, 1913, *Heller*. UTAH. "Zion National Park near summit, north of Zion Canyon in yellow pine belt, May 13, 1936,"

Cottam 6996. ARIZONA. Jacob's Pool, Jaeger. (The fact that in a single season Jaeger collected *flowering plants* of the violet at 7500 feet in June in the Charleston Mountains and at 5000 feet elevation in July at the Arizona station leads one to suspect that the data given on the Arizona label is incorrect.)

This species appears to thrive best in the Charleston Mountains in partial shade in soil containing considerable humus on brushy north or east slopes where it is associated with *Juniperus*, *Cercocarpus*, scattered Rocky Mountain yellow pine and nut pine. Its poorest development is in the open pine forest in Lee Canyon. The limited distribution of this plant may be accounted for if it proves to be a "lime violet," since the Charleston Mountains seem to be composed largely of limestone. Apparently very few seeds of *V. charlestonensis* are matured; not more than one plant out of ten of those observed in June, 1937, had developed mature capsules. On one unusually vigorous plant there were twenty-three sterile flowers and only two seed pods.

Chromosome counts made from bud fixations of *V. charlestonensis* showed a diploid count of  $n = 6$ .

On the basis of the scarcity of this species and its limited distribution, it might be assumed that it represents a relic which is dying out because of its low reproduction rate. Also, because it apparently has no very close relatives in the genus, it may be assumed to be very old. Probably its closest living relative is *Viola purpurea* subsp. *integrifolia* Baker and Clausen, yet in the size of its seeds and in its subterranean stems it resembles *V. pedunculata* Torr. and Gray. *Viola charlestonensis* differs from the above-mentioned species in the following particulars:

(a) It is covered with very short, retrorse, appressed, white hairs; on the leaf veins these hairs are so dense that the veins appear as white lines on the upper surfaces of the leaves.

(b) It is the only species in the *Nuttallianae* with wholly entire leaf margins; in *V. purpurea* subsp. *integrifolia* most of the later leaves are entire.

(c) It is the only species in the *Nuttallianae* with the spur pubescent on the exterior.

(d) The capsules and seeds are larger than those of *V. purpurea*, but they are comparable in size to those of *V. pedunculata*, which, however, is a much larger plant.

(e) The caruncle is very small and smooth; in all other species of the *Nuttallianae* it is rough and even wrinkled and it spreads out from the base of the funiculus in all directions.

*PEDICULARIS SEMIBARBATA* Gray subsp. *charlestonensis* (Pennell and Clokey) comb. nov. *P. semibarbata* Gray var. *charlestonensis* Pennell and Clokey in Clokey, Bull. So. Calif. Acad. Sci. 38: 6. 1939.

Typical *P. semibarbata* is a variable species of the high moun-

tains of southern California. The subsp. *charlestonensis* is confined to the Charleston Mountains and the Sheep Range, both of Clark County, Nevada. Owing to the distinct geographical range as well as to the morphological differences, this entity should be considered a subspecies rather than a variety.

CASTILLEJA LINARIAEFOLIA Benth. var. *omnipubescens* (Pennell) comb. nov. *C. linariaefolia* Benth. forma *omnipubescens* Pennell, Proc. Acad. Nat. Sci. Phila. 89: 424. 1938.

As var. *omnipubescens* is confined to the southern part of the range of *C. linariaefolia* and in some areas is the only form found, it is considered worthy of varietal rank.

South Pasadena, California.

## A NEW PINE FROM MOUNT ROSE, NEVADA

HERBERT L. MASON AND W. PALMER STOCKWELL

In September of 1938 an unusual pine was observed growing on the east slopes of Mount Rose in Washoe County, Nevada. In general aspect this pine appears to be like its forest associate, *Pinus Jeffreyi* Murray, its most obvious difference being its diminutive cones. Closer examination, careful analyses, and preliminary breeding experiments, however, disclose a number of very important differences in structure, biochemistry and behavior that may serve to separate these two pines. A discussion of these differences and of the interrelationships of the new pine with other members of the genus must await further developments of a program of study now seven years under way at the Institute of Forest Genetics of the United States Forest Service in cooperation with the University of California. Some of this work, however, has reached a point where publication is desirable, hence it is necessary that the pine be named. It will suffice here to report that several successful field crosses have been made and many of the  $F_1$  hybrids are now growing in the nursery; the resin has been analyzed chemically and will be reported upon in due time. Precise statement of range must await the investigation of several recent reports of additional occurrences before it can be completely formulated. Hence the present paper will deal with the pine in the stand encompassing the type locality, which to date is the only stand positively known to exist by virtue of specimens in hand. As now understood the new pine is essentially confined to the lateral moraines about seven miles long and less than a mile wide flanking the upper reaches of Galena Creek and ranging in altitude from 7000 to 8500 feet. This precise habitat did not exist prior to the Pleistocene. Only a very few individuals occur off the moraines and these not more than a few hundred feet away. It is unfortunate that the stand today probably represents only



second growth timber, the area having been logged to supply mine timber and building materials for the development of the Comstock Lode at Virginia City in the middle of the last century. The original extent of the stand at this locality is probably lost to us unless some detail of wood anatomy can be discovered for the identification of the stumps of the original forest that eighty-five years of Nevada's climate have failed to erase from the scene. From these brief statements of the circumstances surrounding the occurrence of this species the reader will sense the fascination of the challenge to investigation offered by this problem. Whence came this pine? If it is of recent origin, what has been the nature of the isolating mechanism that set it apart in the genus? What of its history and parentage? It seems especially fitting to commemorate in the name of these trees the Washoe Indians who hunted in this forest.

*Pinus washoensis* sp. nov. Arbor pyramidatus, alta usque ad 60 m.; truncus valde fastigatus, diametros 1 m.; cortex tenue, maturans cum fissuris asperis vel aliquando laminatum; gemmae terminales ovoideae-acutae, 15–20 mm. longae, rufulae, margines squamarum gemmarum fimbriati; fasciculi ternati vel aliquando binati, vaginae persistentes, rugosae, summae squamarum persistente approximatae; acies virides-griseae, longae 10–15 cm., crassae, subtiliter aequaliterque serrulatae, ordinaes 12 stomata dorsales, ordines sex super supericiebus dorsualibus utrimque, hypodermis biformis, inter ordines stomatum intrusus, ductus resinae medii, 7 ad 10, cellulis parvulis muris crassis marginatae, inaequaliter multiseriatae, endodermis cum muris externis crassis, fasciae distinctae, nec pressae, iuli staminati breve cylindrati, 10–20 mm. longi, rubri-purpurei, eorum squamae gemmarum rubrae-ochraceae, marginis inaequaliter laceratae; iuli ovulati ellipsoidei, 15–20 mm. longi, 10–12 mm. lati, caerulei-purpurei obscuri; conus ovoideus, 5–8 mm. longus, badius, squamae in numero circa 160 ad 190, dehiscentes non reflexae, apophysis dorsualis, demisse pyramidatus; umbo rubrus-ochraceus, cum aculeo levis reflecto; semen 8 mm. longum, 3 mm. crassum, pars liberum alae rhomboideum-cuneatum, 1.5 ad 2 longitudines seminis.

Pyramidal tree up to 60 meters high; trunk strongly tapered, diameter 1 meter; bark maturing late, thin, becoming rough fissured or occasionally plated; terminal buds ovoid-acute, 15–20 mm. long, reddish, bud scale margins fimbriate; fascicles ternate or occasionally binate, sheaths persistent, rugose, scale tips remaining approximate; needles gray-green, 10–15 cm. long, stout, finely and regularly serrulate, dorsal stomata in 12 rows, ventral in 6 rows on each face, hypoderm biform, intrusive between the rows of stomata, resin ducts 7 to 10, median, bordered by small thick-walled cells, irregularly multiseriate, endodermis with heavy outer walls, bundles distinct, not crowded; staminate catkins short

cylindric, 10–20 mm. long, red-purple, their bud scales tan, with irregularly lacerate margins; ovulate catkins ellipsoid, 15–20 mm. long, 10–12 mm. wide, dark blue-purple; cone ovoid, 5–8 cm. long, nut brown, scales about 160 to 190 in number, not reflexed on dehiscence, apophysis dorsal, low pyramidal, umbo tan, with a slender slightly recurved prickle; seed 8 mm. long, 5 mm. wide, 3 mm. thick, free portion of wing rhombic-cuneate, 1.5 to 2 times the seed.

Specimens examined. Sierra Nevada, east side of Mount Rose, Washoe County, Nevada: altitude 7500 feet, Sept. 9, 1938, *Mason 12078*; altitude 7000 feet, Aug. 8, 1939, *Mason 12228*; altitude 8100 feet, Aug. 6, 1940, *Mason 12370* (type, Herbarium of the University of California, nos. 692993, ovulate, and 692994, staminate); altitude 8500 feet, July 18, 1939, *Stockwell and Cumming, 1455*; *Cumming*, Nov., 1941 (cones only).

Department of Botany, University of California, Berkeley.

California Forest and Range Experiment Station, Berkeley,  
conducted at and in cooperation with the University  
of California at Berkeley.

## REVIEW

*The Botanical Collections of Wilhelm N. Suksdorf, 1850–1932.* By WILLIAM A. WEBER. Research Studies of the State College of Washington, Vol. XII, No. 2. Pp. 51–121. Pl. 1, 2. June, 1944.

"And this," said my guide, pausing for emphasis, "is the Suksdorf collection!" Dozens of bundles of specimens (wrapped and unwrapped, labeled and unlabeled) were piled on top of old wooden herbarium cases, on chairs, on and under tables, and on the floor. A thick coating of black dust covered them and the dingy basement room. This was the Suksdorf collection in 1934. Inside the packages, however, the specimens were still in the beautiful condition they had been left by their meticulous collector. That insects had not played havoc with them was partially due to the foresight of Dr. Harry F. Clements, then plant physiologist at the State College, who had put them all through a drying oven the previous year. The bundles were arranged in accordance with a variety of systems or with no system at all, and most of the external labels had become misplaced or lost. In the absence of field books, diaries, and correspondence, the collector's symbols (in German script) defied translation.

However, the requests of specialists for certain materials were importunate, and were met as fully and promptly as possible. Preparing a loan of any group necessitated going through every bundle. In the absence of herbarium assistants, the "curator" and his graduate fellows (Dr. Reed C. Rollins and Mr. Louis O. Dillon) and a few willing undergraduate students spent long hours in tiresome searching. Despite these difficulties, a number of small groups and a few large ones (*Carex*, *Plectritis*, *Castilleja*,



*Arnica*, the Cruciferae, the Saxifragaceae) were made available for general use. By 1937 the entire collection had been arranged systematically, fumigated repeatedly, and stored in as safe a place as could be found.

With this background in mind, it is easier to appreciate properly the excellent work Mr. Weber has done with the collection, culminating in this paper devoted to Wilhelm N. Suksdorf and his herbarium. No other western collector, to my knowledge, has had his travels, activities, and accomplishments so carefully and appreciatively documented. The study consists of six parts: an introduction, a biographical sketch, an itinerary, a list of described entities based upon the Suksdorf collection, a gazetteer, and a list of Suksdorf's few scientific writings. Two portraits are reproduced, that of the collector in middle age being a particularly fine addition to our record of him.

Born near Kiel in Germany and defeated by ill health in his efforts to obtain an education in the United States, Suksdorf was handicapped by a reluctance to use the English language, which largely cut him off from communication with his contemporaries. He is remembered chiefly for the materials which he provided for Asa Gray and Sereno Watson, and for many overseas botanists. The biographer appears to share Suksdorf's conviction that he was not fully appreciated by the botanical world. That he was among the best of botanical collectors cannot be questioned, but that he was a potentially great botanist can. His longest publication, dealing with *Amsinckia* (in which he described 201 "new species") does credit to his powers of observation but not to his taxonomic judgment. The species described by others from Suksdorf's collections have fared much better than those named by himself.

Mr. Weber's study properly concentrates on Suksdorf's itinerary of sixty years, and on a careful gazetteer of the places he visited in Washington, Oregon, California, and Montana. This is particularly useful in the case of Suksdorf because of his fondness of unusual (often Indian) geographical names, and his practice of freely coining German place names when no others were available. Suksdorf's specimens, collected in this area, were prepared in large sets and were widely distributed; they contributed much to Asa Gray's and Sereno Watson's knowledge of the western floras and are still useful tools to systematists.

The present paper is a model of its kind. It is to be hoped that its publication will stimulate the preparation of accounts of the activities and movements of other distinguished collectors in the Pacific Northwest. The collecting localities of others, from Douglas and Nuttall to the Howell brothers and Cusick, need similar careful study and documentation. The floras of the area are so diverse that a precise determination of past collecting sites would greatly facilitate our understanding of the distribution of many groups of plants.—LINCOLN CONSTANCE, Department of Botany, University of California, Berkeley.